

REMARKS

Claims 1 and 2 are amended and new claims 30 and 31 are added. Support for the claims is found in the description of the invention, claims and figures as originally filed. For example, page 10 lines 1-16 and page 11 line 15 to page 12 line 2. No new matter is added by the amendments and new claims.

Applicants respectfully point out that none of the prior art discloses a steel billet having a spherodized carbide structure and a limiting upsetting ratio of 90 % or greater without the occurrence of cracks. These properties are extremely important with respect to cold forging steel billets to make engine parts, such as crank shafts and connecting rods, efficiently and economically. Applicants discovered that as the carbide crystal becomes more spherical in shape, the steel billet becomes more resistant to cracking upon cold forging. The spheroidal shape of the carbide crystal is measured by its aspect ratio as defined in Table 1. A lower aspect ratio indicates a more spheroidal shape. In one embodiment of the invention, the aspect ratio of the spherodized carbide is 300 % or less. In another embodiment, the billet has a fine spherodized martensitic structure comprising ferrite and cementite on its surface. In yet another embodiment, the billet has a fine spherodized martensitic structure comprising ferrite and cementite and a carbide aspect ratio of the spherodized carbide is 300 % or less. All of these embodiments provide a steel billet having a limiting upsetting ratio of 90 % or greater without the occurrence of cracks.

Applicants submit that amended claims 1 and 2 and new claims 30 and 31 are allowable over the art of record, and respectfully request prompt passage to allowance.

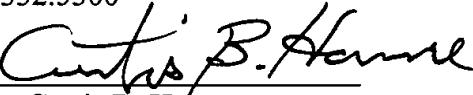
Attached hereto is a marked-up version of claims 1 and 2 showing the amendments. The attached page is captioned "VERSION WITH MARKINGS TO SHOW CHANGES MADE".

If a telephone conference would be helpful in resolving any issues concerning this communication, please contact Applicants' primary attorney-of record, Curtis B. Hamre (Reg. No. 29,165), at (612) 336.4722.

Respectfully submitted,

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S/N 09/575,348



VERSION WITH MARKINGS TO SHOW CHANGES MADE

1. (THRICE AMENDED) A billet of steel for continuous cold forging, [characterized by] comprising 0.46 - 0.48 wt % of C (carbon), 0.14 or less of Si (silicon), 0.55 - 0.65 wt % of Mn (manganese), 0.015 wt % or less of P (phosphorus), 0.015 wt % or less of S (sulfur), 0.15 wt % or less of Cu (copper), 0.20 wt % or less of Ni (nickel), and 0.35 wt % or less of Cr (chromium), wherein a carbide of the billet is spherodized and the billet has a limiting upsetting ratio of 90 % or more without the occurrence of cracks.

2. (THRICE AMENDED) A billet of steel for continuous cold forging, [characterized by] comprising 0.46 - 0.48 wt % of C (carbon), 0.14 or less of Si (silicon), 0.55 - 0.65 wt % of Mn (manganese), 0.015 wt % or less of P (phosphorus), 0.015 wt % or less of S (sulfur), 0.15 wt % or less of Cu (copper), 0.20 wt % or less of Ni (nickel), and 0.35 wt % or less of Cr (chromium), wherein [such that] a carbide of the billet is spherodized and has an aspect ratio of 300 % or less and the billet has a limiting upsetting ratio of 90 % or more without the occurrence of cracks.

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